EJEKCIONA FRAKCIJA LEVE KOMORE I ANTEROPOSTERIORNI DIJAMETAR LEVE PRETKOMORE KAO PREDIKTORI ISHODA AKUTNOG ISHEMIJSKOG MOŽDANOG UDARA

ORIGINALNI RAD

ORIGINAL ARTICLE

THE LEFT VENTRICULAR EJECTION FRACTION AND THE LEFT ATRIAL ANTEROPOSTERIOR DIAMETER AS PREDICTORS OF ACUTE ISCHEMIC STROKE OUTCOME

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SAŽETAK

Uvod: Akutni moždani udar predstavlja značajno zdravstveno opterećenje. Kako su varijable dobijene transtorakalnom ehokardiografijom dokazani prediktori ishoda kardioloških oboljenja, pokušali smo da utvrdimo njihov značaj u predikciji ishoda ove grupe bolesnika.

Cilj rada je dokazivanje hipoteze da je uvećanje leve pretkomore iskazano porastom anteroposteriornog dijametra kao i pad sistolne fukcije leve komore, posmatran vrednošću ejekcione frakcije, prediktor lošeg ishoda kod ovih bolesnika.

Materijali i metode: Osnov metodologije je analiza podataka 106 bolesnika sa akutnim ishemijskim moždanim udarom uz podatke o modifikovanom Rankin skoru na otpustu, koji su pokazatelj funkcionalnog ishoda oboljenja.

Rezultati: Pokazana je korelacija između funkcionalnog ishoda bolesti u odnosu na ejekcionu frakciju leve komore. Opadanjem ejekcione frakcije leve komore raste mogućnost lošijeg ishoda bolesti. Veličina leve pretkomore je takođe testirana kao prediktor lošijeg ishoda u smislu veće leve pretkomore povezane sa lošijim ishodom bolesti, a hipoteza se i ovde pokazala tačnom, s obzirom da postoji korelacija veličine njenog prečnika u odnosu na ishod bolesti.

Zaključak: Od praćenih parametara, prediktivnu vrednost ka ishodu bolesti pokazuje ejekciona frakcija leve komore, kao i veličina levog atrijuma, a u odnosu na funkcionalni ishod bolesti.

Ključne reči: moždani udar, ejekciona frakcija, leva pretkomora

ABSTRACT

Introduction: Acute stroke represents a significant health burden. Since the variables obtained by transthoracic echocardiography are proven predictors of the outcome of cardiac diseases, we tried to determine their importance in predicting the outcome of this group of patients.

The aim of the work is to prove the hypothesis that the enlargement of the left atrium, expressed by the increase in the anteroposterior diameter and the decrease in the systolic function of the left ventricle, as observed by the value of the ejection fraction, predict a bad outcome in these patients.

Materials and methods: The methodology is based on the data analysis of 106 patients with acute ischemic stroke, including data on the modified Rankin score at discharge, which indicates the disease's functional outcome.

Results: A correlation was shown between the functional outcome of the disease in relation to the ejection fraction of the left ventricle. As the ejection fraction of the left ventricle decreases, the possibility of a worse disease outcome increases. The size of the left atrium was also tested as a predictor of a worse outcome in terms of a larger left atrium associated with a worse outcome of the disease, and the hypothesis proved to be correct here as well, given that there is a correlation between the size of its diameter and the outcome of the disease.

Conclusion: The monitored parameters, the left ventricular ejection fraction and the left atrium size, show predictive value for the disease's functional outcome.

Keywords: stroke, ejection fraction, left atrium

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UVOD

U globalu, moždani udar je ostao drugi vodeći uzrok smrti i treći vodeći uzrok smrti i invaliditeta zajedno, u svetu [1]. Takođe, projekcije pokazuju da će se stopa incidence ishemijskog moždanog udara povećavati kod oba pola u svim starosnim grupama između 2020. i 2030. godine u zemljama sa niskim dohotkom [2]. Bolest predstavlja četvrti uzrok smrtnosti u Sjedinjenim Američkim Državama [3]. Od 1990. do 2019. godine, incidenca moždanog udara je u porastu paralelno sa rastom smrtnosti od moždanog udara, a tokom istog perioda starosno standardizovane stope incidence su se smanjile [1].

Uobičajeni faktori rizika za aterosklerozu predstavljaju i rizikofaktore za ishemijski moždani udar te, kako je iz prakse i poznato, moždani udar uobičajeno ima više kardioloških komorbiditeta. Kako su dobro definisane varijable dobijene transtorakalnom ehokardiografijom ujedno i dokazani prediktori ishoda kardioloških oboljenja [4-7], ovde smo pokušali da utvrdimo njihov značaj u predikciji ishoda kod bolesnika sa akutnim ishemijskim moždanim udarom.

Cilj rada je da se proceni povezanost jasno definisanih ehokardiografskih varijabli na funkcionali ishod bolesnika sa ishemijskim moždanim udarom, odnosno testiranje hipoteze da je uvećanje leve pretkomore, iskazano porastom anteroposteriornog (AP) dijametra, kao i pad sistolne fukcije leve komore, posmatran vrednošću ejekcione frakcije, prediktor lošeg ishoda kod bolesnika sa akutnim ishemijskim moždanim udarom.

MATERIJALI I METODE

Pregled i analiza podataka dobijenih retrospektivnom studijom relevatnih varijabli iz istorija bolesti 106 bolesnika sa ishemijskim moždanim udarom, lečenih u periodu od 1. februara 2023. godine do 1. avgusta 2023. godine u Specijalnoj bolnici „Sveti Sava". Prikupljeni su demografski podaci o polu i starosti ispitanika uz selektovane parametre transtorakalnih ehokardiografskih studija, odnosno varijable sistolne funkcije leve komore iskazane kroz vrednost ejekcione frakcije (LVEF) merene Simpsonovom metodom, kao i anteroposteriorni dijametar (AP) levog atrijuma vizuelizacijom u parasternalnom uzdužnom preseku (PLAX). Takođe i rezultate modifikovane Rankin skale na otpustu kao varijable ishoda oboljenja, a koja predstavlja rutinsku i klinički najfrekventniju skalu za procenu invaliditeta nakon moždanog udara. Kategorije modifikovanog Rankin skora prikazane su u Tabeli 1, dok grafički prikaz raspodele bolesnika ilustruje Grafikon 1.

Zavisno od tipa varijabli i normalnosti raspodele, deskripcija podataka prikazana je kao n (%), aritmetička sredina ± standardna devijacija (as ± sd) ili medijana

INTRODUCTION

Globally, stroke remains the second leading cause of death and the third leading cause of death and disability combined [1]. Projections also indicate that the incidence rate of ischemic stroke will increase among both genders across all age groups in low-income countries between 2020 and 2030 [2]. Stroke is the fourth leading cause of mortality in the United States [3]. From 1990 to 2019, the incidence of stroke has risen in parallel with an increase in stroke-related mortality, although age-standardized incidence rates have declined during the same period [1].

Common risk factors for atherosclerosis are also risk factors for ischemic stroke. As clinical experience shows, stroke often presents with multiple cardiac comorbidities. Since well-defined variables obtained through transthoracic echocardiography are proven predictors of cardiovascular outcomes [4-7], this study aimed to determine their significance in predicting outcomes in patients with acute ischemic stroke.

The objective of this study was to evaluate the association of clearly defined echocardiographic variables with the functional outcome of patients with ischemic stroke, specifically testing the hypothesis that left atrial enlargement, indicated by an increase in the anteroposterior (AP) diameter, as well as reduced left ventricular systolic function, reflected by ejection fraction values, are predictors of poor outcomes in patients with acute ischemic stroke.

MATERIALS AND METHODS

The study involved a retrospective review and analysis of data collected from 106 patients with ischemic stroke treated between February 1, 2023, and August 1, 2023, at the Specialized Hospital "Sveti Sava." Demographic data on the sex and age of the participants were collected, along with selected parameters from transthoracic echocardiographic studies, respectively variables of left ventricular systolic function expressed through the left ventricular ejection fraction (LVEF) measured using Simpson's method, as well as the anteroposterior diameter (AP) of the left atrium visualized in the parasternal long-axis view (PLAX). Additionally, the modified Rankin Scale scores at discharge, which serve as outcome variables and represent the most commonly used clinical scale for disability assessment after stroke, were analyzed. The categories of the modified Rankin score are presented in Table 1, with a graphical distribution illustrated in Figure 1.

Depending on the type of variables and the normality of distribution, data were described as n (%), mean ± standard deviation (mean ± SD), or median (range, min-max). Spearman's correlation coefficient

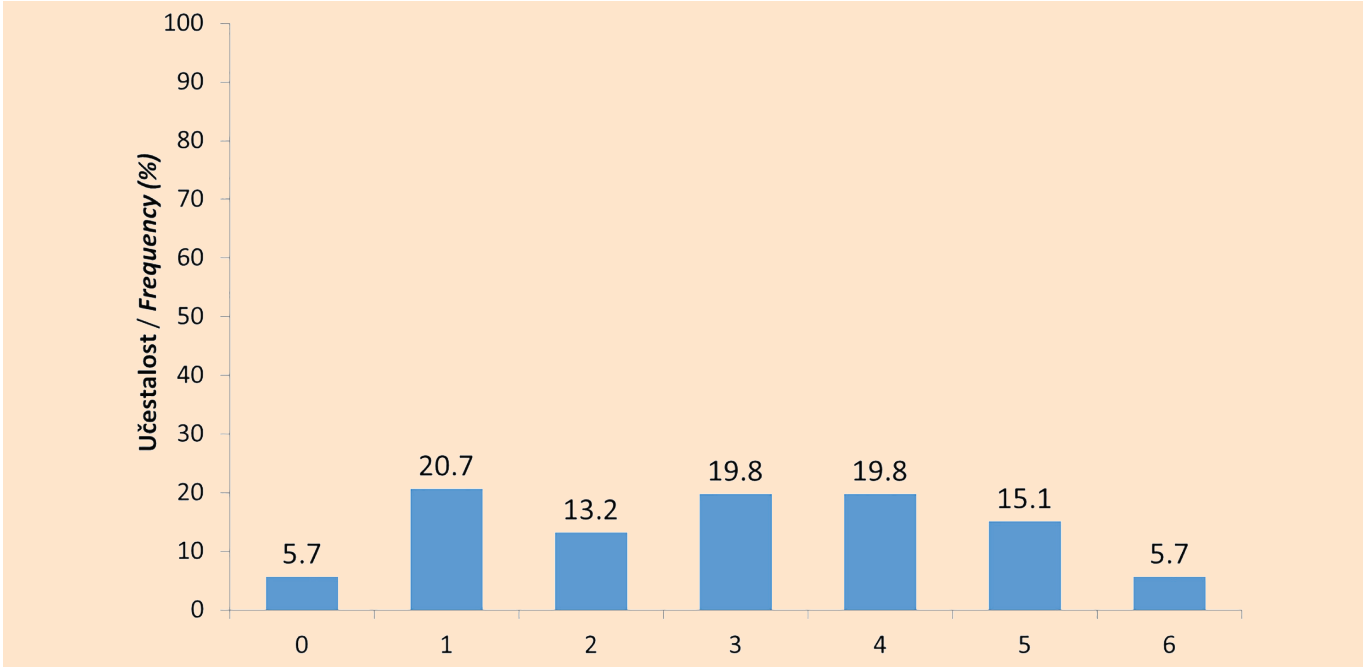
Tabela 1. Modifikovan Rankin skor

Table 1. Modified Rankin Scale

mRS	Opis / *Description*	*n (%)*
0	Bez simptoma / *No symptoms*	6 (5 .7%)
1	Bez značajne onesposobljenosti – sposoban za obavljanje svih aktivnosti / *No significant disability – able to carry out all activities*	22 (20 .7%)
2	Laka onesposobljenost – sposoban za samozbrinjavanje ali ne i za sve premorbidne aktivnosti / *Slight disability – able to look after own affairs but not capable of all pre-stroke activities*	14 (13 .2%)
3	Umerena onesposobljenost – zahteva pomoć ali sposoban za samostalni hod / *Moderate disability – requires help but able to walk independently*	21 (19 .8%)
4	Umereno teška onesposobljenost – nije sposoban za samostalni hod / *Moderately severe disability – unable to walk independently*	21 (19 .8%)
5	Teška onesposobljenost – nepokretan i kompletno zavisan od tuđe nege i pomoći / *Severe disability – bedridden and completely dependent on care*	16 (15 .1%)
6	Smrt / *Death*	6 (5 .7%)
UKUPNO / *TOTAL*		106 (100%)

Grafikon 1. Distribucija ispitanika među kategorijama modifikovanog Rankin skora po relativnim učestalostima

Figure 1. The distribution of participants across the categories of the modified Rankin Scale by relative frequencies



(opseg, min – max). Za procenu povezanosti modifikovanog Rankin skora sa ostalim varijablama korišćen je Spirmanov koeficijent korelacije. Statističke hipoteze su testirane na nivou statističke značajnosti (alfa nivo) od 0,05. Svi podaci su obrađeni u softverskom paketu IBM SPSS Statistics 24 (SPSS Inc, Chicago, IL, USA).

REZULTATI

U studiju je uključeno 106 bolesnika sa akutnim ishemijskim moždanim udarom prosečne starosti oko 69 godina (69,2 godine sa standardnom devijacijom 12,1 godina), od čega je nešto više od trećine ženskog pola (68 ispitanika muškog i 38 ženskog pola). Najmlađi bo-

assessed the association between the modified Rankin score and other variables. Statistical hypotheses were tested at a significance level (alpha level) of 0.05. All data were processed using IBM SPSS Statistics 24 (SPSS Inc, Chicago, IL, USA).

RESULTS

The study included 106 patients with acute ischemic stroke, with an average age of approximately 69 years (69.2 years, standard deviation 12.1 years). A little over one-third of the patients were female (68 male and 38 female participants). The youngest patient was 35 years old, and the oldest was 90 years old. Table 2 provides an

Tabela 2. Sociodemografke varijable, faktori rizika i medijana ishoda bolesti

Table 2. Sociodemographic Variables, Risk Factors, and Median Disease Outcome

Varijable / *Variables*	N = 106
Pol, n (%) / *Gender, n (%)*	
muški / *male*	68 (64 .2%)
ženski / *female*	38 (35 .8%)
Starost, as ± sd / *Age, am ± sd*	69 .2 ± 12 .1
Hipertenzija, n (%) / *Hypertension, n (%)*	96 (90 .6%)
Atrijalna fibrilacija, n (%) / *Atrial fibrillation, n (%)*	34 (32 .1%)
Dijabetes mellitus, n (%) / *Diabetes mellitus, n (%)*	28 (26 .4%)
Hiperlipidemija, n (%) / *Hyperlipidemia, n (%)*	28 (26 .4%)
Pušenje, n (%) / *Smoking, n (%)*	26 (24 .5%)
Zloupotreba alkohola, n (%) *Alcohol abuse, n (%)*	8 (7 .5%)
Gojaznost, n (%) / *Obesity, n (%)*	10 (9 .6%)
Rankin skor, medijana (opseg) / *Rankin skore, median (range)*	2 (0–6)

AS – aritmetička sredina; sd – standardnu devijaciju

am –arithmetic mean; sd –standard deviation

lesnik je dobi 35 godina, a najstariji 90 godina. U Tabeli 2 je dat prikaz sociodemografskih varijabli uzorka, kao i prikaz profila faktora rizika kod bolesnika uključenih u studiju. Kod svih ispitanika je urađena transtorakalna ehokardiografska studija koja definiše ejekcionu frakciju leve komore po Simpsonovoj metodi, uz anteroposterioni dijametar leve pretkomore iz duge parasternalne ose, uz dopunske varijable studije koje su prikazane u Tabeli 3.

Ejekciona frakcija leve komore, određena po Simpsonovoj metodi, kao univerzalni i široko rasprostranjen marker sistolne funkcije leve komore (LVEF), korišćena je kao prediktor ishoda oboljenja kod bolesnika sa akutnim ishemijskim moždanim udarom. Testiranje ishoda oboljenja u odnosu na ejekcionu frakciju leve komore je sprovedeno testirajući neparametarsku korelaciju ejekcione frakcije leve komore i ishoda bolesti prikazanog putem vrednosti modifikovanog Rankin skora.

Tabela 3. Ehokardiografski parametri

Table 3. Echocardiographic Parameters

Varijable / *Variables*	N = 106
EDD, as ± sd / am ± sd	52 .3 ± 5 .02
ESD, as ± sd	35 .06 ± 4 .92
IVS, as ± sd	11 .05 ± 1 .83
ZZ, as ± sd	10 .30 ± 1 .69
LVEF, as ± sd	55 .58 ± 10 .63
AP, as ± sd	38 .66 ± 10 .22

AS – aritmetička sredina; sd – standardnu devijaciju

am –arithmetic mean; sd –standard deviation

overview of the sociodemographic variables of the sample, as well as the profile of risk factors among the patients included in the study. All participants underwent transthoracic echocardiographic studies, which measured left ventricular ejection fraction (LVEF) using Simpson's method, along with the anteroposterior diameter of the left atrium from the parasternal long axis view and additional echocardiographic variables presented in Table 3.

The left ventricular ejection fraction, determined by Simpson's method, as a universal and widely used marker of left ventricular systolic function (LVEF), was used as a predictor of disease outcome in patients with acute ischemic stroke. Testing disease outcomes in relation to left ventricular ejection fraction was conducted by analyzing the non-parametric correlation between the left ventricular ejection fraction and disease outcome, represented by the modified Rankin Scale score.

Testing, using Spearman's correlation, found that there is a lower degree of correlation between the outcome of the disease in relation to the LVEF with a negative sign (rs = -0.31; $p = 0.001$; Table 4), i.e. that with a decrease in the degree of systolic ventricular function, expressed by the left ventricular ejection fraction using the Simpson method, the degree of functional disability of patients after acute ischemic stroke increases.

The size of the left atrium, expressed as its anteroposterior diameter in the parasternal long-axis view (PLAX), was also tested as a predictor of poorer outcomes. A larger left atrial diameter was associated with higher Rankin scores (rs = 0.24; $p = 0.015$; Table 4), implying that an increase in the size of the left atrium

Tabela 4. Vrednosti Spirmanovog koeficijenta i verovatnoće

Table 4. Spearman's Coefficient Values and Probability

Varijable / *Variables*	Povezanost / *Correlation*	Rankin / *Rankin*
LVEF	r_s	-0,31
	p	0,001
EDD	r_s	0,04
	p	0,700
ESD	r_s	0,14
	p	0,162
IVS	r_s	-0,12
	p	0,223
Godine / *Age*	r_s	0,10
	p	0,289
AP	r_s	0,24
	p	0,015
ZZ	r_s	-0,02
	p	0,881

Testiranjem, putem Spirmanove korelacije, ustanovljeno je da postoji manji stepen korelecije između ishoda bolesti u odnosu na LVEF sa negativnim predznakom (r_s = -0,31; p = 0,001; Tabela 4), tj. da opadanjem stepena sistolne komorske funkcije, izraženog ejekcionom frakcijom leve komore Simpsonovom metodom, raste stepen funkcionalne onesposobljenosti bolesnika nakon akutnog ishemijskog moždanog udara.

Veličina leve pretkomore, izražena svojim anteroposteriornim dijametrom u dugoj parasternalnoj osi (PLAX preseku), takođe je testirana kao prediktor lošijeg ishoda u smislu veće pretkomore povezane sa lošijim ishodom bolesti. Viša vrednost ovog prečnika leve pretkomore je povezana sa višim stepenom Rankin skora (r_s = 0,24; p = 0,015; Tabela 4), odnosno porast veličine leve pretkomore implicira lošiji funkcionalni ishod kod bolesnika sa akutnim ishemijskim moždanim udarom.

Ostali testirani parametri ultrazvučne morfometrije leve komore, svaki zasebno, ne daju povezanost sa funkcionalnim ishodom akutnog moždanog udara.

DISKUSIJA

U studiju je uključeno 106 ispitanika oba pola prosečne starosti oko 69 godina koji su bolovali od akutnog ishemijskog moždanog udara. U uzorku dominiraju ispitanici muškog pola kojih je nešto manje od dve trećine (64,2%).

Među merenim, testiranim i analiziranim ultrazvučnim parametrima kod ove kohorte bolesnika, kao prediktor lošeg toka bolesti, sa manjim stepenom negativne korelacije, dokazala se LVEF merena Simpsonovom metodom. Dakle, niža LVEF favorizuje prognostički lošiji ishod bolesti. LVEF je širokoispitivani parametar kao prediktor smrti usled srčane insuficijencije i kardiovaskularne smrti uopšte [4-7], a u manjem broju ispitivanja i kao uzrok ishoda usled akutnog moždanog udara.

Postoje studije [7] koje su pokazale korelaciju između ishoda ishemijskog moždanog udara i veoma niskih vrednosti LVEF. Takođe, i drugi autori povezuju pad vrednosti LVEF sa lošijim ishodom bolesti [8-10]. Do istih rezultata, kao i u našoj grupi bolesnika, a u vezi asocijacije LVEF i ishoda akutnog ishemijskog moždanog udara pacijenata koji su podvrgnuti trombolitičkoj terapiji dolaze i drugi istraživači [11]. Nadalje, literatura dovodi u vezu redukovanu LVEF sa smanjenim jednogodišnjim preživljavanjem kod bolesnika sa akutnim ishemijskim moždanim udarom ili tranzitornim ishemijskim atakom [12,13]. Dakle, rezultati drugih autora su skladni sa analizom našim podataka.

Sa druge strane, dimenzija leve pretkomore, kao prediktor ishoda akutnog ishemijskog moždanog udara, testirana je zbog povezanosti uvećanja leve pretkomore sa porastom incidence atrijalne fibrilacije, kao dokazanog rizikofaktora za akutni ishemijski moždani udar.

is associated with a worse functional outcome in patients with acute ischemic stroke.

When analyzed individually, other echocardiographic parameters of left ventricular morphometry did not show any significant association with functional outcomes following acute stroke.

DISCUSSION

The study included 106 patients of both genders with acute ischemic stroke, with an average age of approximately 69 years. The sample was predominantly male, accounting for just under two-thirds of the participants (64.2%).

Among the measured, tested, and analyzed echocardiographic parameters in this patient cohort, LVEF measured by Simpson's method was identified as a predictor of poor disease progression, showing a slight negative correlation. In other words, lower LVEF is associated with a prognostically worse disease outcome. LVEF is a widely studied parameter as a predictor of mortality due to heart failure and cardiovascular death in general [4-7], but it has been less frequently investigated in the context of outcomes following acute stroke.

Some studies [7] have demonstrated a correlation between ischemic stroke outcomes and very low LVEF values. Other researchers have similarly linked reduced LVEF to poorer disease outcomes [8-10]. Consistent with our findings, other studies investigating the association between LVEF and outcomes in patients undergoing thrombolytic therapy for acute ischemic stroke have reported similar results [11]. Additionally, the literature associates reduced LVEF with decreased one-year survival in patients with acute ischemic stroke or transient ischemic attack [12,13]. Thus, our findings align with those reported by other researchers.

On the other hand, left atrial size was tested as a predictor of acute ischemic stroke outcomes due to its association with increased incidence of atrial fibrillation, a well-established risk factor for acute ischemic stroke. Since atrial fibrillation is a known risk for systemic and cardiac embolization, the hypothesis was formed that an enlarged left atrium, as a pathomorphological substrate, would be statistically significantly more common in the group of patients with worse outcomes and correlate with disease outcome; this was confirmed through testing.

Most of the literature focuses on investigating the relationship between left atrial size, particularly its enlargement, as a risk factor for acute ischemic stroke. Meta-analyses have demonstrated that an increase in left atrial size significantly raises the risk of developing

Kako je atrijalna fibrilacija dobro definisan rizik sistemske, pa tako i kardijalne embolizacije, pošlo se od hipoteze da uvećena leva pretkomora, kao patomorfološki susptrat, treba da bude statistički značajno češća u grupi bolesnika sa lošijim ishodom bolesti i da bude u korelaciji sa ishodom, što je testiranjem ovde i dokazano.

Naime, većina literature se bazira na istraživanje odnosa veličine leve pretkomore, odnosno njenog uvećanja, kao rizikofaktora za akutni ishemijski moždani udar. Na osnovu meta-analize istraživanja dokazano je da porast veličine leve pretkomore značajno povećava rizik od razvoja akutnog ishemijskog rizika, ali bez analize njene veličine kao faktora predikcije ishoda bolesti [14,15].

Istom temom su se, iako u malom broju, bavili i drugi autori koji ispituju odnos morfologije levog atrijuma i predikcije ishoda akutnog ishemijskog moždanog udara. Jedno od istraživanja je demonstriralo da prečnik leve pretkomore ima nezavisnu vezu sa smrtnošću od svih uzroka, uključujući i akutni ishemijski moždani udar, kod oba pola [16]. Ovde nije posmatran akutni ishemijski moždani udar kao izolovana varijabla već kao deo ukupne kardiovaskularne smrti, tako da je ovo polje koje treba istražiti dodatno na većem uzorku, s obzirom da se radi o masovnom nezaraznom oboljenju.

Limit studije je potreba da se testira uticaj ostalih komorbiditeta, kao i same starosti ispitanika na funkcionalni ishod akutnog ishemijskog moždanog udara, što je naš dalji zadatak koji se može ostvariti daljim proširenjem uzorka.

ZAKLJUČAK

Od praćenih ultrazvučnih parametara, prediktivnu vrednost ka ishodu bolesti pokazuje LVEF određena metodom po Simpsonu. Naime, postoji statistički značajna povezanost između veličine LVEF između grupa bolesnika u odnosu na funkcionalni ishod akutnog ishemijskog moždanog udara i to tako što pad vrednosti ejekcione frakcije favorizuje lošiji funkcionalni ishod moždanog udara.

Veličina levog atrijuma, iskazana anteroposteriornim dijametrom merenim u PLAX preseku, pokazala je značajnu povezanost u odnosu na funkcionalni ishod akutnog ishemijskog moždanog udara, sa pozitivnim predznakom, odnosno porast veličine prečnika leve pretkomore favorizuje lošiji funkcionalni ishod.

Moždani udar je gotovo uvek deo spektra kardiovaskularnih poremećaja koji uvek utiču na način lečenja bolesnika, koji je u savremenim uslovima individualizovan, ali uz poštovanje principa dobre kliničke prakse lečenja kako moždanog udara tako i svih pratećih komorbiditeta paralelno. Dakle, radi se o multimorbidnom stanju gde postoji medjusobni uticaj patoloških stanja jednih na druge, što rezultira u potrebi za po-

acute ischemic stroke, but without analyzing its size as a predictor of disease outcomes [14,15].

Some authors, albeit in limited numbers, have also examined the relationship between left atrial morphology and prediction of acute ischemic stroke outcomes. One study demonstrated that left atrial diameter has an independent association with all-cause mortality, including acute ischemic stroke, in both genders [16]. However, in that study, acute ischemic stroke was not considered an isolated variable but rather part of overall cardiovascular mortality. This indicates a need for further research in this area with larger sample sizes, given the prevalence of this non-communicable disease.

A limitation of this study is the need to assess the impact of other comorbidities and the age of participants on the functional outcome of acute ischemic stroke. This represents a further objective for future research, which could be achieved by expanding the sample size.

CONCLUSION

The left ventricular ejection fraction determined by the Simpson method has a predictive value for the disease outcome of the monitored ultrasound parameters. Namely, there is a statistically significant relationship between the size of the LVEF between groups of patients in relation to the functional outcome of acute ischemic stroke, and that is because a decrease in the value of the ejection fraction favors a worse functional outcome of the stroke.

The size of the left atrium, expressed as the anteroposterior diameter measured in the PLAX view, also significantly correlated with the functional outcome of acute ischemic stroke. This correlation had a positive sign, meaning an increased left atrial diameter is associated with a worse functional outcome.

Stroke is almost always part of the spectrum of cardiovascular disorders that always affect the way patients are treated, which in modern conditions is individualized, but with respect to the principles of good clinical practice of treating both stroke and all accompanying comorbidities in parallel. Therefore, it is a multimorbid condition where there is an influence of pathological conditions on each other, which results in the need for the aforementioned individualization of therapy, and therefore, stroke should always be viewed as a part of the cardiovascular "puzzle."

menutim individualizovanjem terapije te zato moždani udar uvek treba posmatrati kao deo kardiovaskularne „slagalice".

SPISAK SKRAĆENICA

LVEF – Ejekciona frakcija leve komore
AP – Anteroposteriorni dijametar levog atrijuma
PLAX – Parasternalni uzdužni presek
EDD – Enddijastolni dijametar leve komore
ESD – Endsistolni dijametar leve komore
IVS – Debljina interventrikularnog septuma
ZZ – Debljina zadnjeg zida leve komore

Sukob interesa: Nije prijavljen.

LIST OF ABBREVIATIONS

LVEF – Left Ventricular Ejection Fraction
AP – Anteroposterior Diameter of the Left Atrium
PLAX – Parasternal Long Axis View
EDD – End-Diastolic Diameter of the Left Ventricle
ESD – End-Systolic Diameter of the Left Ventricle
IVS – Interventricular Septum Thickness
PW – Posterior Wall Thickness of the Left Ventricle

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